

# PATENT SPECIFICATION

(11) 1422 142

- 1422 142 (21) Application No. 21769/72 (22) Filed 10 May 1972  
 (23) Complete Specification filed 6 Aug. 1973  
 (44) Complete Specification published 21 Jan. 1976  
 (51) INT CL<sup>7</sup> B44C 1/22  
 (52) Index at acceptance  
 B6G 1C 2B  
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## (54) PROCESS

(71) We, FISONS LIMITED, a British Company, of Fison House, 9 Grosvenor Street, London, W.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a process for producing a patterned thermoplastic material, and to patterned thermoplastic materials made by the said process.

It has now been found that by abrading only the raised areas of the embossed surface of a chemically embossed thermoplastic material, a pattern having a suede-like appearance on the original background may be obtained.

Accordingly, the present invention provides a process for the production of a patterned thermoplastic material which comprises abrading only the raised areas of the embossed surface of a chemically embossed foamed thermoplastic material to form a suede-like surface on the said raised areas.

The product of the process, particularly when produced in sheet form, has an appearance similar to that of the so-called "flocked" wallpapers. The process is thus of special application in the production of wall and ceiling covering materials, but also has application in the production of handbags, shoes, and upholstery materials.

Chemically embossed foamed thermoplastic materials are materials on which an embossed effect is obtained chemically by the selective expansion of the thermoplastic material. A number of processes are known, but preferred are those involving the application of a composition containing an inhibitor or activator for a blowing agent to selected areas of a thermoplastic polymeric material containing the blowing agent. On heating the material, the blowing agent decomposes to different extents, depending on whether it underlies a printed area or an unprinted area. The finished material has an embossed effect caused by this differential expansion of the thermoplastic material. Two such processes are described

in British Patent Specification Nos. 1,069,998 and 1,147,983. In both processes, adjustment of the levels of the various components in the polymeric and printing ink formulations gives control over the degree of expansion in both the printed and unprinted areas, so that the required texture in both areas can be obtained.

In this specification, the term "raised areas" is used to designate the plateau areas of the embossed surface, and the term "depressed areas" is used to designate the valley areas.

In a preferred embodiment, the chemically embossed thermoplastic material is prepared by a process which comprises forming into sheet form an expandable mix containing a thermoplastic polymeric material and a blowing agent, applying to selected areas of the surface of the sheet a composition containing a substance which activates or inhibits the decomposition of the blowing agent, and heating the sheet to a temperature and for a time such that the thermoplastic polymeric material in the areas to which the said composition was applied expand to a different extent to those areas to which the composition was not applied.

In the most preferred embodiment the composition applied to the expandable mix contains an activator for the blowing agent.

A wide range of thermoplastic polymeric materials and blowing agents may be used, for example as conventional in the art. Preferably, however, the polymeric material is a polyvinyl chloride or is a copolymer of vinyl chloride and a copolymerisable monomer such as vinyl acetate or vinylidene chloride. The blowing agent is preferably azodicarbonamide.

The expandable mix preferably contains a stabiliser for the thermoplastic polymeric material. Suitable stabilisers include salts and oxides of lead, cadmium, barium, zinc, tin and other metals, and mixtures thereof. The stabiliser used in the thermoplastic material may also act as an activator for the blowing agent. Consequently, the stabiliser can be used to control the cell size beneath the depressed areas of the chemically embossed material. The preferred stabilisers for use in this process

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are mixtures of cadmium and barium soaps, such as the stearates and laurates or organic compounds of tin such as dibutyl tin laurate. Preferably the stabiliser is present as 0.1 to 5 parts per hundred parts by weight of thermoplastic polymer.

The expandable mix preferably also contains a plasticiser, for example phthalates such as butyl benzyl phthalate, dioctyl phthalate, dialphanyl phthalate and diisooctyl phthalate, phosphoric esters such as tricresyl phosphate and octyl diphenyl phosphate. The expandable mix preferably contains from 50 to 120 parts per hundred parts thermoplastic polymer, more preferably from 65 to 80 parts per hundred parts thermoplastic polymer.

The expandable mix may also contain any other desired additives such as fillers, pigments, dyes, diluents and the like.

Preferably the expandable mix is coated as a plastisol onto a backing. The backing may be, for example, a woven fabric, a resinous material, paper, impregnated felted fibre or a release material such as paper coated for example with a silicone derivative.

The chemically embossed material may be abraded with a precision surface abrader such as a conventional leather sander. Alternatively, other surface abraders or grinders may be used, for example those having high speed revolving wheels, drums or belts having an abrasive surface of, for example, sandpaper, silicon carbide or emery cloth.

If the thermoplastic material is of substantially uniform colour throughout, then the pattern will appear in differing shades of that colour due to the difference in texture. If it is desired to have a pattern in more than one colour, the raised or depressed areas of the unbraded material may be printed with a dye which migrates into the cellular material. Alternatively, where the embossed material is obtained by the application of an activating or inhibiting composition, the composition may contain a dye or pigment. However care must be exercised to ensure that the dyed depth of the material is not removed. A further method is to coat uniformly at least part of the surface, before or after embossing, with a dye which migrates into the thermoplastic material only to a limited extent. Then if the raised areas are abraded away to remove the dyed depth, the suede-effect areas will be of a different colour to the background areas.

The present invention is illustrated by the following example.

#### Example

A vinyl plastisol was prepared as follows:

Breon P.130/1 (polyvinyl chloride)	100
Dioctyl phthalate	65
Epoxidised Oil	3
Calcium carbonate	35
Azodicarbonamide (Genitron AC/4)	4

Mark TT.	1.5	
Titanium dioxide	3	65
Pigment	0.1	

This was coated onto a woven fabric to a thickness of 0.015" and pre-gelled for 60 seconds at 135°C. A pattern was applied to the surface by gravure printing with an ink of the following composition:

Plexigum M334 (acrylic copolymer)	7	
Plexigum M345 (acrylic copolymer)	7	
Pigment	7.5	
Activator Concentrate	18	75
Methyl ethyl ketone	42	
Methyl isobutyl ketone	22	
Toluene	16	

After a period of 16—24 hours the coated sheet was expanded in a circulating hot-air oven by heating for 50—90 seconds at 200°C. After expansion and cooling, the surface of the sheet was abraded on a standard leather sander to a depth such that only the raised areas were abraded.

The product had a surface made up of a smooth unbraded background on which was a raised pattern, corresponding to the printed pattern, have a suede-like texture.

A similar effect can be obtained by using the inhibition chemical embossing method described in B.P. 1,069,998, which after expansion gives raised and depressed areas suitable for abrasion as above.

"Breon", "Genitron" and "Plexigum" are Registered Trade Marks.

#### WHAT WE CLAIM IS:—

1. A process for the production of a patterned thermoplastic material which comprises abrading only the raised areas of the embossed surface of a chemically embossed (as herein defined) foamed thermoplastic material to form a suede-like surface on the said raised areas.

2. A process according to Claim 1 wherein the chemically embossed thermoplastic material is prepared by a process which comprises forming into sheet form an expandable mix containing a thermoplastic polymeric material and a blowing agent, applying to selected areas of the surface of the sheet a composition containing a substance which activates or inhibits the decomposition of the blowing agent, and heating the sheet to a temperature and for a time such that the thermoplastic polymeric material in the areas to which the said composition was applied expand to a different extent to these areas to which the composition was not applied.

3. A process according to Claim 2 wherein the composition applied to the expandable mix contains an activator for the blowing agent.

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4. A process according to Claim 2 or Claim 3 wherein the thermoplastic polymeric material is a polyvinyl chloride or is a copolymer of vinyl chloride and a copolymerisable monomer such as vinyl acetate or vinylidene chloride.
5. A process according to any of Claims 2 to 4 wherein the blowing agent is azodicarbonamide.
6. A process according to any of Claims 2 to 5 wherein the expandable mix contains a stabiliser for the thermoplastic polymeric material.
7. A process according to Claim 6 wherein the stabiliser is selected from salts and oxides of lead, cadmium, barium, zinc and tin, and mixtures thereof.
8. A process according to Claim 7 wherein the stabiliser is a mixture of cadmium and barium soaps, or an organic compound of tin.
9. A process according to any of Claims 2 to 8 wherein the expandable mix is coated onto a backing.
10. A process according to any preceding Claim wherein the raised areas are abraded by means of a precision surface abrader.
11. A process according to any preceding Claim wherein the raised areas are abraded by means of a surface abrader or grinder having a high speed revolving wheel, drum or belt having an abrasive surface.
12. A process according to any preceding Claim wherein the thermoplastic material is of substantially uniform colour throughout.
13. A process according to any of Claims 1 to 11 wherein the raised or depressed areas of the unbraded material are printed with a dye which migrates into the cellular material.
14. A process according to any of Claims 2 to 8 or Claims 10 or 11 as appended to any of Claims 2 to 8 wherein the composition containing the substance which activates or inhibits the decomposition of the blowing agent also contains a dye or pigment.
15. A process according to any of Claims 1 to 11 wherein at least part of the surface of the thermoplastic material is uniformly coated, before or after the chemical embossing process, with a dye which migrates into the thermoplastic material to a limited extent, and the embossed material is abraded to remove the dyed material in the raised areas.
16. A process for the production of a patterned thermoplastic material substantially as hereinbefore described.
17. A process for the production of a patterned thermoplastic material substantially as described in the foregoing example.
18. A patterned thermoplastic material when prepared by a process as claimed in any preceding Claim.

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Printed for Her Majesty's Stationary Office, by the Courier Press, Leamington Spa, 1976.  
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

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